

Application of the method of static fluctuational approach to the Bogolyubov-Kolesnikov-Shelah model

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Abstract

A method of calculating the equilibrium correlation functions of any arbitrary order for the Baldwin- Kolesnikov-Shelah (BKSh) model is suggested based on the static fluctuational approach. The method based on only one controllable approach allows the so-called equations of long-range coupling to be obtained which contain all information on the sought-after equilibrium correlation functions within the scope of the BKSh model. Calculations of the sought-after equilibrium correlation functions allow one to go beyond the scope of the conventional molecular field approach and to take into account the effect of field fluctuations on the gap behavior and the heat capacity to the left and right of the critical point. For the simplest case disregarding a dependence of the potential on the wave vector, temperature dependences of the energy gap and heat capacity with allowance for the fluctuations are presented. It is demonstrated that in this case, the fluctuations are small for three-dimensional systems, but sharply increase with decreasing dimensionality of the system. © 2010 Springer Science+Business Media, Inc.

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Keywords

BKSh model, energy gap, equation of long-range coupling, fluctuations, heat capacity, static fluctuational approach, superconductivity, thermodynamics